DOCUMENT RESUME

ED 214 962 TM 820 116

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TITLE Inter-Relationships between Self-Estimates of Aptitudes and Tested Abilities on the GATB.
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PUB DATE Feb 81
NOTE 10p.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Aptitude; *Aptitude Tests; *Correlation; *Hypothesis Testing; *Self Evaluation (Individuals); Vocational Aptitude
IDENTIFIERS General Aptitude Test Battery

ABSTRACT

This study tested the hypothesis that measured aptitudes and self-ratings of these same aptitudes reflect a common domain of psychometric behavior. Male and female applicants for vocational guidance completed a self-rating scale and then the General Aptitude Test Battery (GATB). The self-rating scale contained six vocational/educational aptitudes. These were general intelligence, verbal, numerical, spatial, form perception, and clerical aptitudes. A seven point rating scale of very high to very low was included for each aptitude. Components analyses were carried out on each six by correlation matrix and canonical correlation analysis was used to identify maximal relationships between weighted linear components of self-rated and tested aptitudes. Two separate components analyses revealed the major proportion of variance can be accounted for by one factor on which all the scales loaded highly. The high degree of congruence between the first two components in the unrotated analyses was revealed by Tucker coefficients of 0.992 and 0.794. The size of the maximum canonical correlation (0.58) indicated some overlap between self-ratings and test scores. (Author/DWH)

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ED214962

Research Report

Inter-Relationships between self-estimates of aptitudes and tested abilities on the GATB

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James A. Athanasou,
February, 1981.

TM 820116

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Division of Vocational Guidance Services,
N.S.W. Department of Industrial Relations.

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James A. Athanasou,
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Inter-relationships between self-estimates of aptitudes and tested abilities on the GATB

ABSTRACT

This study tested the hypothesis that measured aptitudes and self-ratings of these same aptitudes reflect a common domain of psychometric behaviour. Male and female (n=103) applicants for vocational guidance completed a self-rating scale and then the General Aptitude Test Battery (GATB). The self-rating scale contained descriptions of six vocational/educational aptitudes. Principal components analyses were carried out on each 6 by 6 correlation matrix and canonical correlation analysis was used to identify maximal relationships between weighted linear components of self-rated and tested aptitudes. The two separate principal components analyses revealed that the major proportion of the variance can be accounted for by one factor on which all the scales loaded highly. The high degree of congruence between the first two components in the unrotated analyses was revealed by Tucker coefficients of 0.992 and 0.794. Furthermore, the size of the maximum canonical correlation (0.58) indicated some overlap between self-ratings and test scores.

PREFACE

While overreaction is usually a characteristic of their neurotic clients, it is also a quality too often exhibited by psychologists in the practice of their profession. Counsellors usually seem quite prepared to assist the people who come to them for help to see that most issues are not simply black or white and/or that there are middle or compromise courses of action between extreme alternative. Yet in an issue like the use of psychological testing, battle lines are drawn between the warring factions, each entrenched in extreme and diametrically opposed positions.

It is a little alarming that on different occasions the Vocational Guidance Research Section has been enlisted on both sides of this issue. The reason for this is not that Research Officers are miscreants and renegades, changing sides with the fortunes of the war. Rather it is because we see that both positions have some merit and that the real fault lies in the "extremeness" of each position. Psychological tests do have their limitations as well as their strengths but then so too do any substitute materials or techniques. This study examines one such substitute, self-estimates of ability.

An earlier report concluded that there was considered doubt about identifying self-estimates of abilities with objective assessments of those abilities. This research indicated some quite large differences between assessed and estimated abilities. These descrepancies were interpreted as distortions of self-perception in the estimates. It could be concluded from the data presented that the validity of self-estimates of abilities is quite questionable. The structure of the interrelationships between self-estimates of different abilities has not been closely studied and yet comparison of such structures with those of assessed abilities would throw further light on the validity of self-estimates. This report investigates these relationships in order to establish in which contexts, if any, self-estimates of abilities are likely to be an adequate substitute for psychological tests of ability.

Robert Pryor,
Senior Research Officer.

Inter-relationships between self-estimates of aptitudes and tested abilities on the GATB

The concurrent validity of self-estimates and their utility are two distinct issues (Mischel, 1968). With respect to aptitude testing, most studies have rightly questioned the utility of self-ratings. This conclusion has been based on reported low correlations (e.g. De Nisi & Shaw, 1977) which accounted for around 25% of the shared variance between self-estimates of apitudes and standardised test scores.

Nevertheless, previous investigations have also shown that correlations between self-estimated and test abilities were generally (a) statistically significant, (b) in the predicted direction and (c) correlations were highest for the same self-estimated vs tested aptitude (Kelso, et.al.1977).

There has been little concern for (a) the structures of measured and self-estimated aptitudes and (b) the extent to which the two methods of assessment overlap. This study tested the hypothesis that measured aptitudes and self-ratings of those same aptitudes reflect a common domain of psychometric behaviour.

Method

Male and female applicants (n=103) for vocational guidance from metropolitan and rural high schools completed a self-rating scale and then the General Aptitude Test Battery - GATB (Dvorak, 1947). The self-rating scale contained descriptions of six vocational/educational aptitudes (General Intelligence, Verbal, Numerical, Spatial, Form Perception and Clerical Aptitudes), plus a 7-point rating scale ("very high" (7) to "very low" (1)) for each aptitude. Correlations between each self-rated and tested aptitude were previously reported (G-0.424; V-0.386;N-0.495; 5-0.332;P-0.238;Q-0.183), and the maximum amount of shared variance was 24.5% (Athanasou, 1980).

Principal components analyses were carried out on each 6 by 6 correlation matrix. Components with eigen values >1.0 were compared across the two samples using Tucker's coefficient of congruence (Harman, 1976). The application of Bartlett's (1950) test, showed that each matrix was suitable for factoring.

Canonical correlation analysis (Cooley & Lohnes, 1971) was used to identify maximal relationships between weighted linear components of self-related and tested aptitudes. Canonical correlation was used to explore the extent to which individuals occupied the same relative positions in one measurement space as they did in the other. Standardised weights for the canonical correlations were computed for the individual self-rated and tested aptitudes. Scale weights (> 0.30) were considered large enough to justify interpretations.

Results

Principal components analysis

Both correlation matrices (Table 1) were characterised by significant ($p < 0.05$) correlations between the scales. Principal components analysis (Table 2) reduced both to one major dimension with an eigen value > 1.0 accounting for more than 50% of the total variance. As expected, all scales loaded highly ($\geq .59$) on these first unrotated components.

The dominance of "General Intelligence" was evident in both solutions, followed by "Spatial Aptitude" in the second unrotated component. The high degree of congruence between these first two components on the unrotated analyses was revealed by Tucker coefficients of 0.992 and 0.794.

Insert Tables 1,2 about here

Canonical Correlation

Results of the canonical correlation analysis are presented in Table 3. There were three significant ($p < 0.05$) correlations, which described three different ways of weighting the self-estimates and aptitudes to obtain a significant linear relationship between the two sets of variables.

Insert Table 3 about here

The first canonical correlation (0.58) accounted for 39.9% of the total variance of the two sets of ratings and linked the General Intelligence variables. Combinations of several self-ratings were linked to individual GATB aptitudes on the second and third canonical variates.

Conclusion and Discussion

Despite differences between the two sets of variables, there is a consistent and considerable overlap. The two separate principal components analyses revealed that the major proportion of the variance can be accounted for by one factor on which all the scales loaded highly. Furthermore, the moderate size of the maximum canonical correlation indicated some overlap between self-ratings and test scores. Thus, taken together, these results strengthen the validity of self-ratings of vocational and educational aptitudes, when they are considered as a total group.

Nevertheless, in guidance settings, there seems to be little support for the substitution of an individual aptitude tests by a self-ratings. The findings of this study would be strengthened by similar analyses using (a) different test batteries, (b) guidance programmes such as the Self-Directed Search (Holland, 1970) and/or (c) improving the method and format of self-ratings.

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TABLE 1: GATB and self-ratings correlation matrices (N=103)*

	G	V	N	S	P	Q
G	-	75	72	64	40	55
V	61	-	53	28	29	51
N	61	24	-	22	38	46
S	39	31	21	-	36	26
P	48	38	42	55	-	35
Q	52	32	56	27	43	-

*Decimal points omitted (Correlations for GATB are above the diagonal, while those for self-ratings form the lower triangular matrix).

TABLE 2: Summary of factor loadings for GATB and Self-ratings.

	GATB			Self-Ratings		
	I	II	H^2	I	II	H^2
G	93	02	95	85	-11	81
V	78	-31	77	65	22	93
N	77	-31	87	71	-51	82
S	60	69	97	61	61	85
P	59	38	96	75	29	74
Q	71	-25	96	72	-38	70
Eigen Value	3.32	0.89		3.15	0.95	
% Total Variance	55.3%	14.8%		52.5%	15.8%	

TABLE 3: Correlations between original variables and derived canonical variates (Regression weights >0.3)*

	Self-ratings	GATB Scores
1st Canonical 0.580 $\chi^2(11)=39.6$ $p < 0.0001$	N 85 V 38	N 91 G 32
2nd Canonical 0.495 $\chi^2(9)=27.1$ $p < 0.01$	P -48 N-46 S -37 V 47 Q 35	S -66 G 65
3rd Canonical 0=4422 $\chi^2(7)=21.0$ $p < 0.05$	G 58 S 53 Q -43 N -36	V 70 S 34 N -52